FEBRUARY 1977
No. 2

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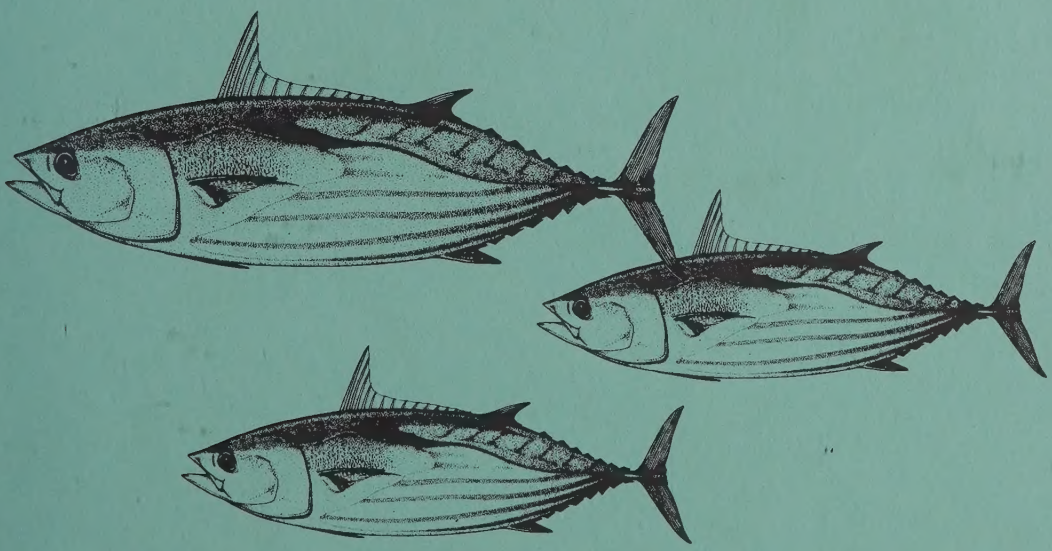
Southwest Fisheries Center-La Jolla, California



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FEBRUARY 1977, No. 2

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PREFACE

This publication, Fishing Information, appears monthly and contains 1) fishery advisory information, 2) a narrative description of pertinent surface temperature conditions, 3) charts of winds and pressures for the eastern North Pacific, 4) charts of sea surface temperature for the North Pacific and eastern tropical Pacific, and 5) charts of subsurface temperature structure in the eastern North Pacific.

A supplement to Fishing Information appears at 15-day intervals throughout the year. It contains a chart of sea surface temperature (contoured at 2°F (1°C) intervals) from Baja California to Vancouver Island out to about 135°W. Special bulletins are published in conjunction with the 15-day sea surface temperature charts which include short-term projections of albacore distribution and locations of productive fishing areas, information on oceanographic and atmospheric conditions, and other information as is appropriate during the albacore fishing season.

NOTE: In order to comply with the National Metric Conversion Act, the sea surface temperature data fields in this publication will be shown in degrees Celsius beginning with the March issue.

The Secretary of Commerce has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department.

Submitted for publication - March 21, 1977

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ENVIRONMENTAL CHARTS ANALYZED BY:

F. Miller (Figures 8 and 9)
J. Renner (Figures 1, 2, 3, 4, 5, 6, 7, and 15 day Supplement)

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Expendable bathythermograph and salinity observations are made by the mates and engineers of the *Hawaiian Queen* of the Matson Navigation Co. The data are processed under supervision of D. R. McLain at the NMFS Pacific Environmental Group, Monterey, California, using computer facilities of the Fleet Numerical Weather Central, Monterey. The project is partially supported by the National Science Foundation and the Office of Naval Research.

Sea Surface Temperature and Environmental Conditions

Forrest R. Miller

Eastern North Pacific

During February the Aleutian low pressure system, with central pressures more than 15 mbs below normal, continued for the fifth straight month to produce unusually intense atmosphere and ocean circulations over the north central Pacific. The high pressure ridge over the north eastern Pacific has been a very persistent and dominant weather pattern which blocked much needed rainfall from most of the west coast until the last week in February. The high pressure ridge extended from the Pacific northwest coastal region southwestward to Hawaii, with only short periods of breakdown due to passages of weak weather fronts. Consequently, there were more clear skies and light southerly winds than normal north of the ridge line, and above normal sea surface temperatures (SST) east of 140°W. The Hawaiian Islands region has been without the usual trade winds most of this winter. Fortunately, the Aleutian low began to move eastward toward the Gulf of Alaska, and the high pressure center receded south and westward from the west coast during the last week in February. This change was reflected in the monthly mean pressure pattern (Figure 2) which showed the Aleutian low and subtropical high pressure centers to be closer to their average positions (Figure 1) than during the previous three months. Because the average atmospheric and ocean circulations did not change significantly from previous months until late in February, the SST patterns (Figures 3,5) were similar to those in January 1977. In the central Pacific the large area of colder than normal SST's greater than 2°F (1.1°C) were associated with very intense ocean-atmosphere circulations which caused extensive and continued ocean mixing and cooling from 30°N to 45°N west of 150°W. In February 1976 this region experienced above normal SST's. Therefore, a comparison of SST's for February 1977 to February 1976 revealed larger than usual negative difference (Figure 7). In contrast, along the west coast and out to 140°W the weaker and more southerly than normal atmosphere and ocean circulations were associated with above normal SST's (Figure 5). Because the west coast atmosphere and ocean circulations were nearly reversed to those in February 1976, the SST differences (Figure 7) were positive and large. This condition has persisted since October 1976 and may have been an important factor in the maintenance of a high pressure ridge along the U.S. west coast.

The seasonal cooling from January to February took place at a normal rate over most of the eastern Pacific. However, during the last week of February 1977, the shift of the Aleutian low toward the Gulf of Alaska and the movement of the eastern Pacific high pressure center to the west and south were good indicators that the warmer than normal SST patterns north of 40°N and east of 140°W would diminish in March if weather fronts and ocean mixing continued to develop along the northwest coast of the U.S. and Canada.

Western North Pacific

The most significant events in the western Pacific in February were the decrease in the intensity of the Aleutian low west of 170°E between 30°N and 45°N and the slow, steady development of an extensive high pressure system which extended eastward from China into the western Pacific south of Japan. Strong ocean fronts persisted east of northern Japan between 35°N and 45°N (Figure 4). The SST's in the frontal region were near normal west of 170°E (Figure 6). However, to the east in the central part of Pacific the colder than normal areas remained from previous

months due to continued and extensive ocean mixing and weather frontal development along the western periphery of the Aleutian low. As the Aleutian low moved eastward in late February, winds decreased and pressures rose. Thereafter, areas of above normal SST's (Figure 6) displaced the below normal areas which had persisted for the past four months. Most of the southwest Pacific had near normal SST's where fairly clear skies and light winds were associated with the subtropical high pressure ridge, which extended across the western Pacific between 20° and 30°N.

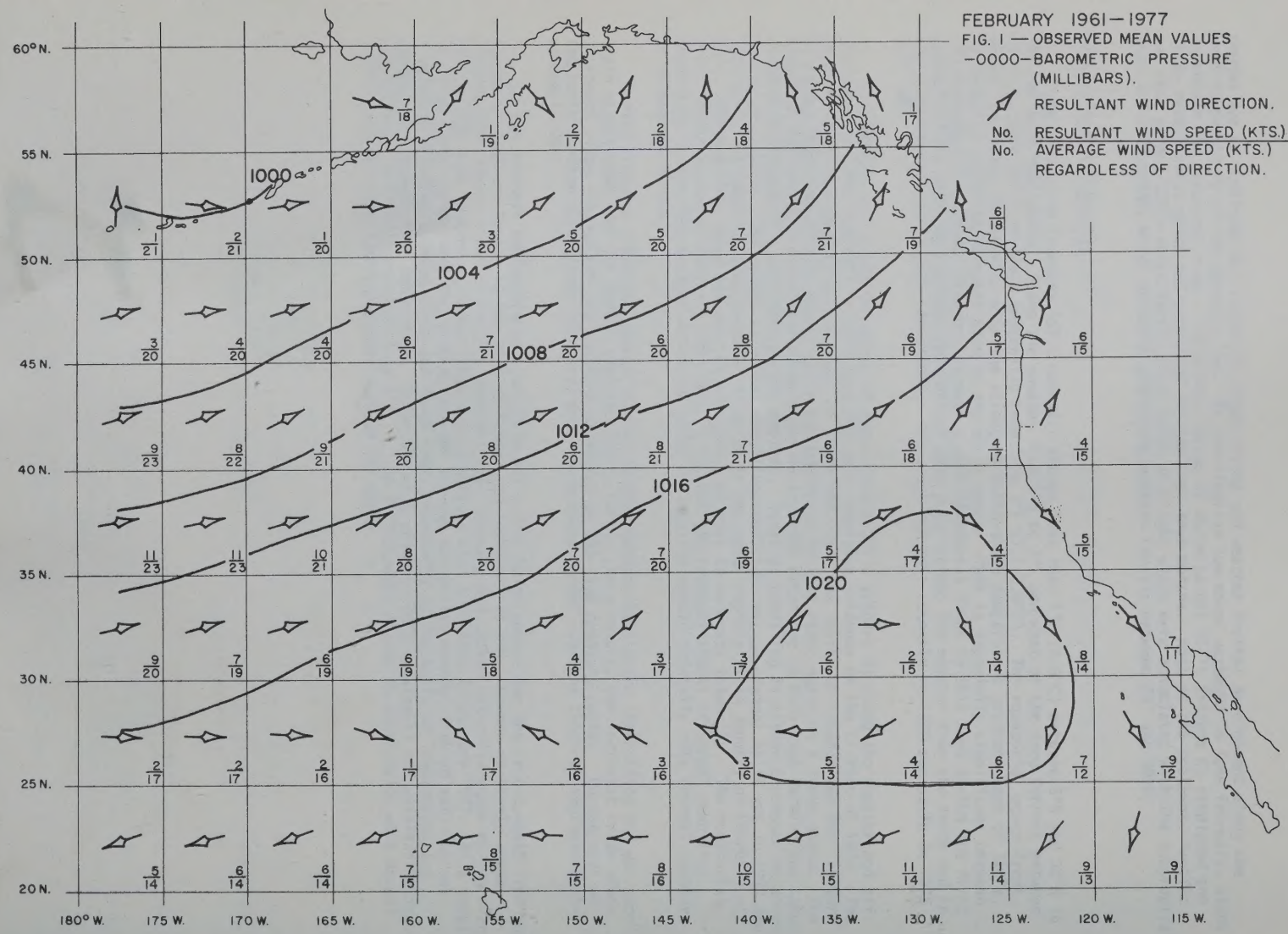
Eastern Tropical Pacific

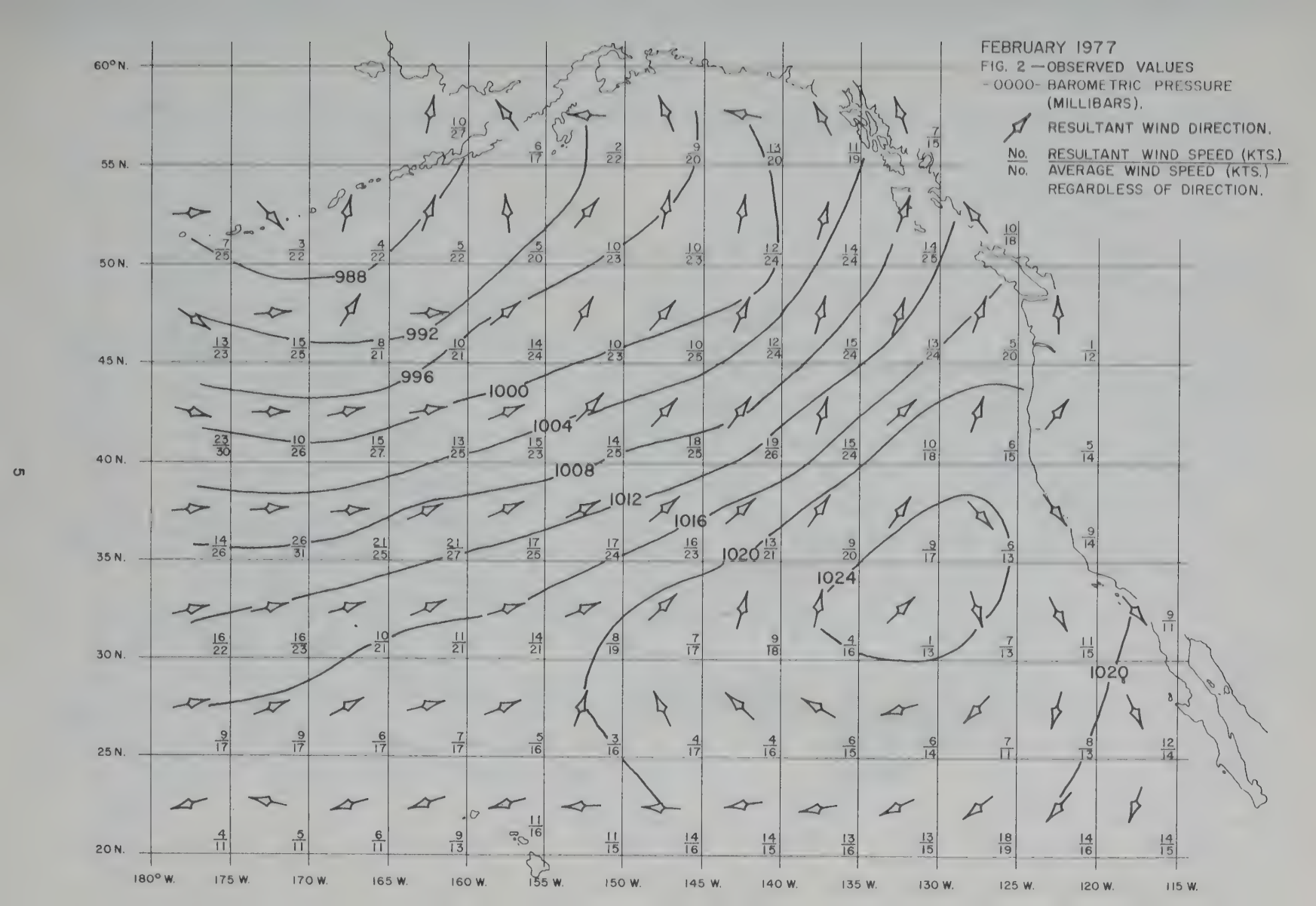
From January to February SST's normally change less than 1°F (0.6°C) between 5°N and 30°N in the northern hemisphere. Along the equator from 5°N to 5°S and west of the Peru Current between 85°W and 95°W SST's increase seasonally from 2 to 3°F (1.1-1.6°C). The equatorial ocean front, which lies along the equator with the strongest north-south temperature gradient east of 110°W, is normally weaker in February than in any other month. This is especially significant between the Galapágos Islands and Ecuador, because a weak equatorial front in this area during the first quarter of the year may indicate movement of warm water across the equator from the north and an early development of El Niño conditions. This occurred most recently in 1972 and again in 1975 and 1976.

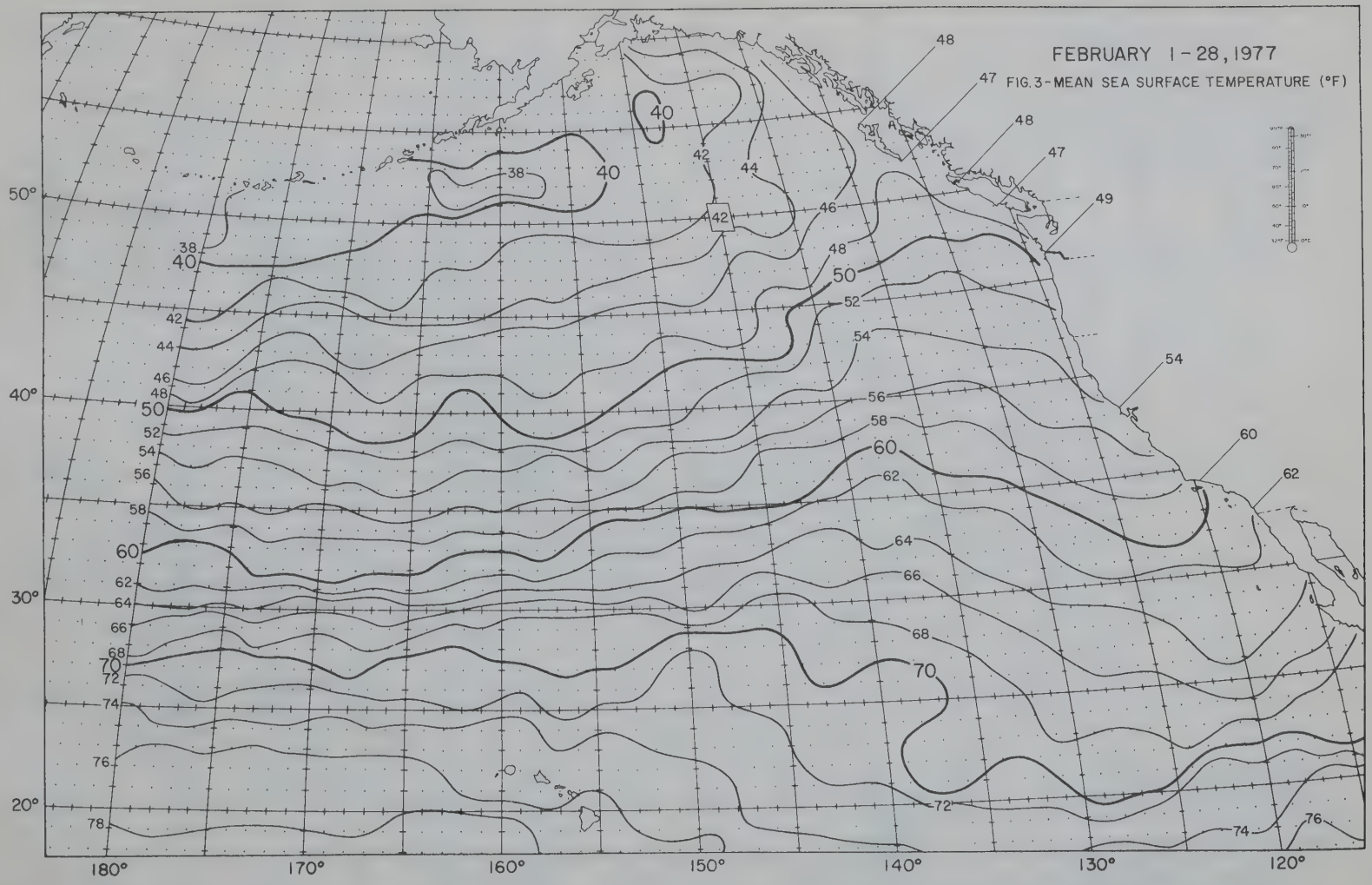
In February 1977 scattered areas of above normal SST's (Figure 9) along the equator and off the coast of Peru from 10°S to 20°S were the only remaining evidence of the El Niño of 1976. The pattern of SST's along the equator east of 140°W and along the coasts of Ecuador and Peru (Figure 8) showed that upwelling of colder water was beginning to take place again on a large scale. The return of colder SST's normally follows a period in which extensive El Niño type warming has taken place in the equatorial and Peru current regions. Usually, upwelling is either depressed or absent during an El Niño. The return to normal upwelling conditions may be gradual as it was in 1958 and 1973 which followed two very large El Niños or it may occur rapidly as in January or February of 1964, 1966 and 1970 which followed El Niño years of weak to moderate intensity. The equatorial front remained weak in February 1977 (Figure 8), but the reestablishment of normal upwelling conditions in the Peru Current extension along the equator should intensify this frontal boundary in subsequent months.

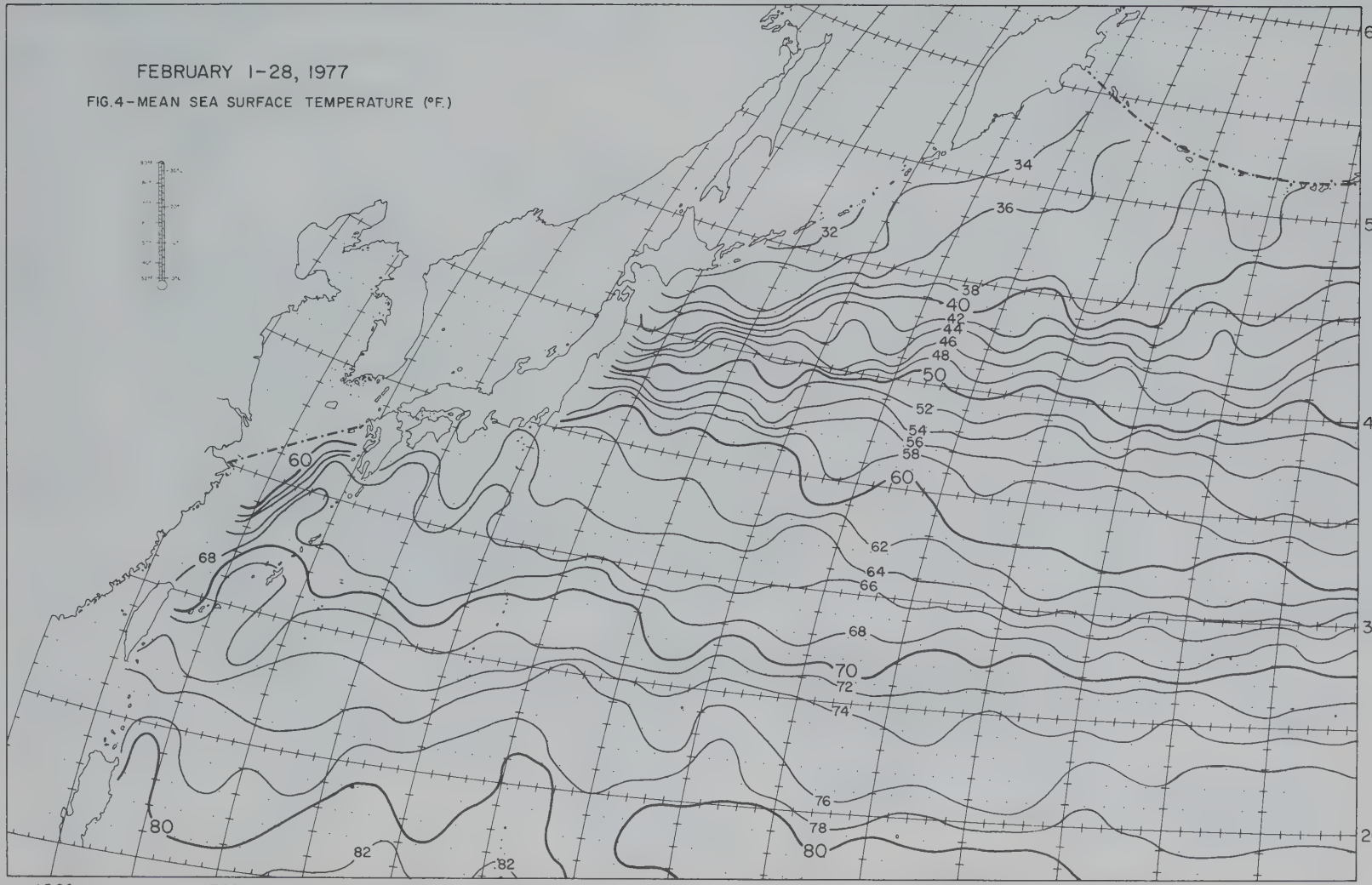
During February the high pressure center in the southern hemisphere intensified and was once again established near its normal position (30°S, 90°W). As a result, the southeast trade winds increased along the eastern and northern periphery of the high pressure center. During most of the month surface wind speeds and cloud cover were above normal over the tropical southern hemisphere to 20°S.

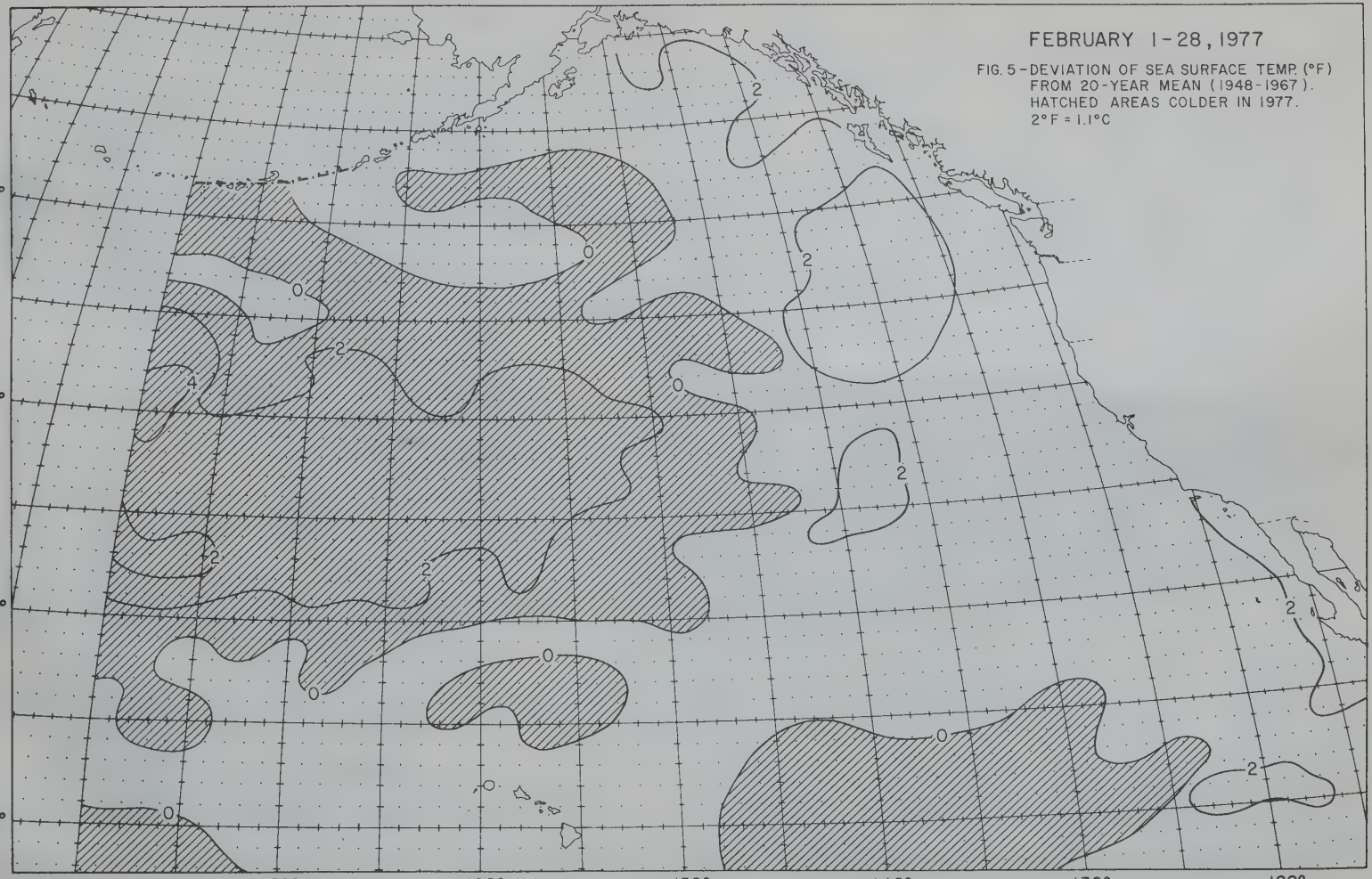
In the northern hemisphere east of 120°W SST's fell below normal for the second month from the coasts of southern Mexico to the Gulf of Panama and southward to 5°N. Strong northerly winds invaded the eastern tropical Pacific frequently in February and caused extensive ocean mixing over most of the tuna fishing grounds. This same condition also prevailed in January 1977. As a result of above normal winds over the fishing grounds for two successive months, fishing activity was frequently affected by high winds and rough seas, especially in the Gulfs of Tehuantepec and Panama and westward from Costa Rica. Along the west coast of Baja California and mainland Mexico from 20°N to 25°N SST's remained 2 to 4°F (1.1 to 2.2°C) above normal in association with normal light winds and good fishing weather most of the month.

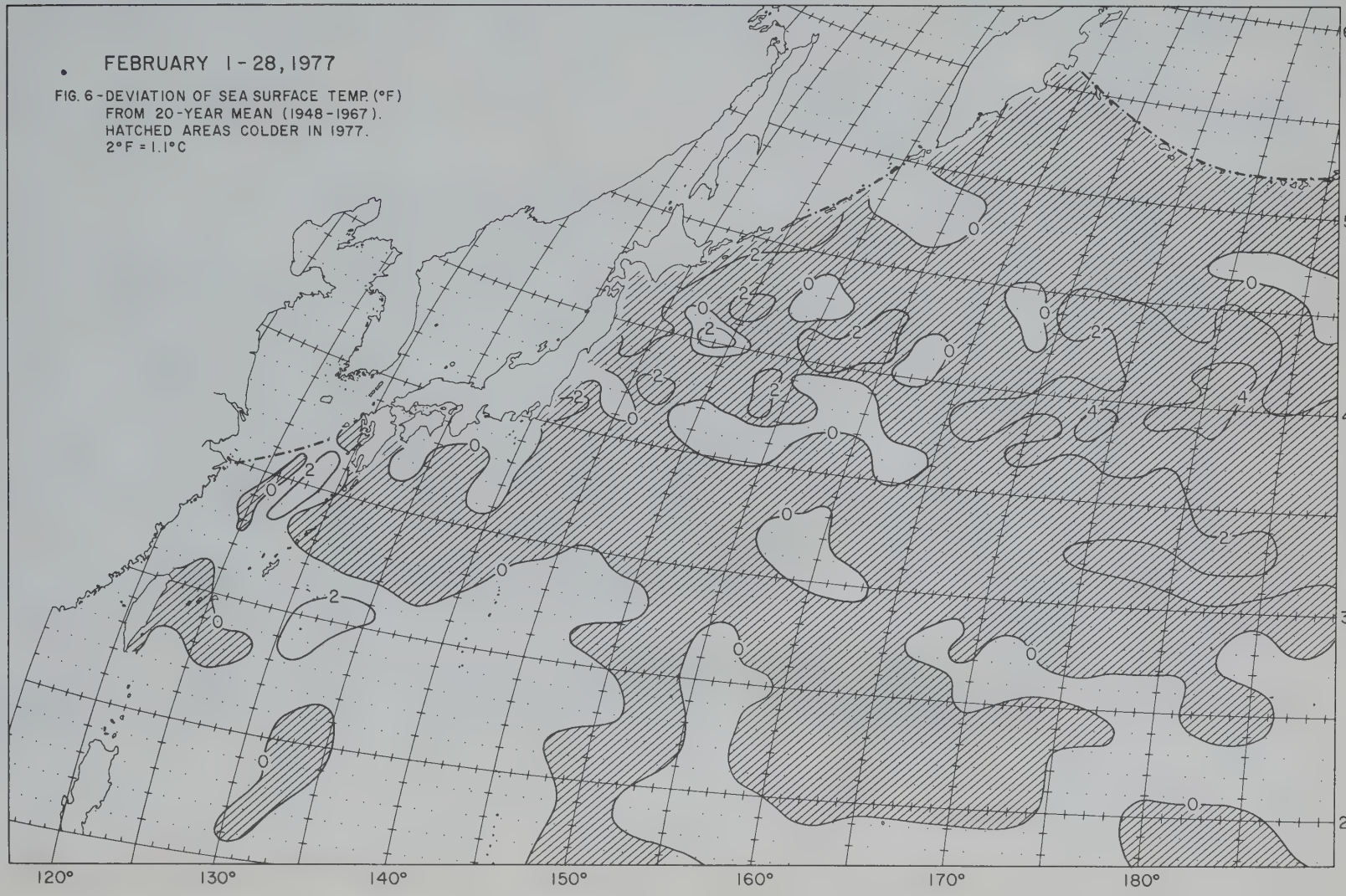

FEBRUARY 1961—1977
FIG. 1 — OBSERVED MEAN VALUES
—0000— BAROMETRIC PRESSURE (MILLIBARS).
RESULTANT WIND DIRECTION.
No. RESULTANT WIND SPEED (KTS.)
No. AVERAGE WIND SPEED (KTS.) REGARDLESS OF DIRECTION.
1000
1004
1008
1012
1016
1020
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.

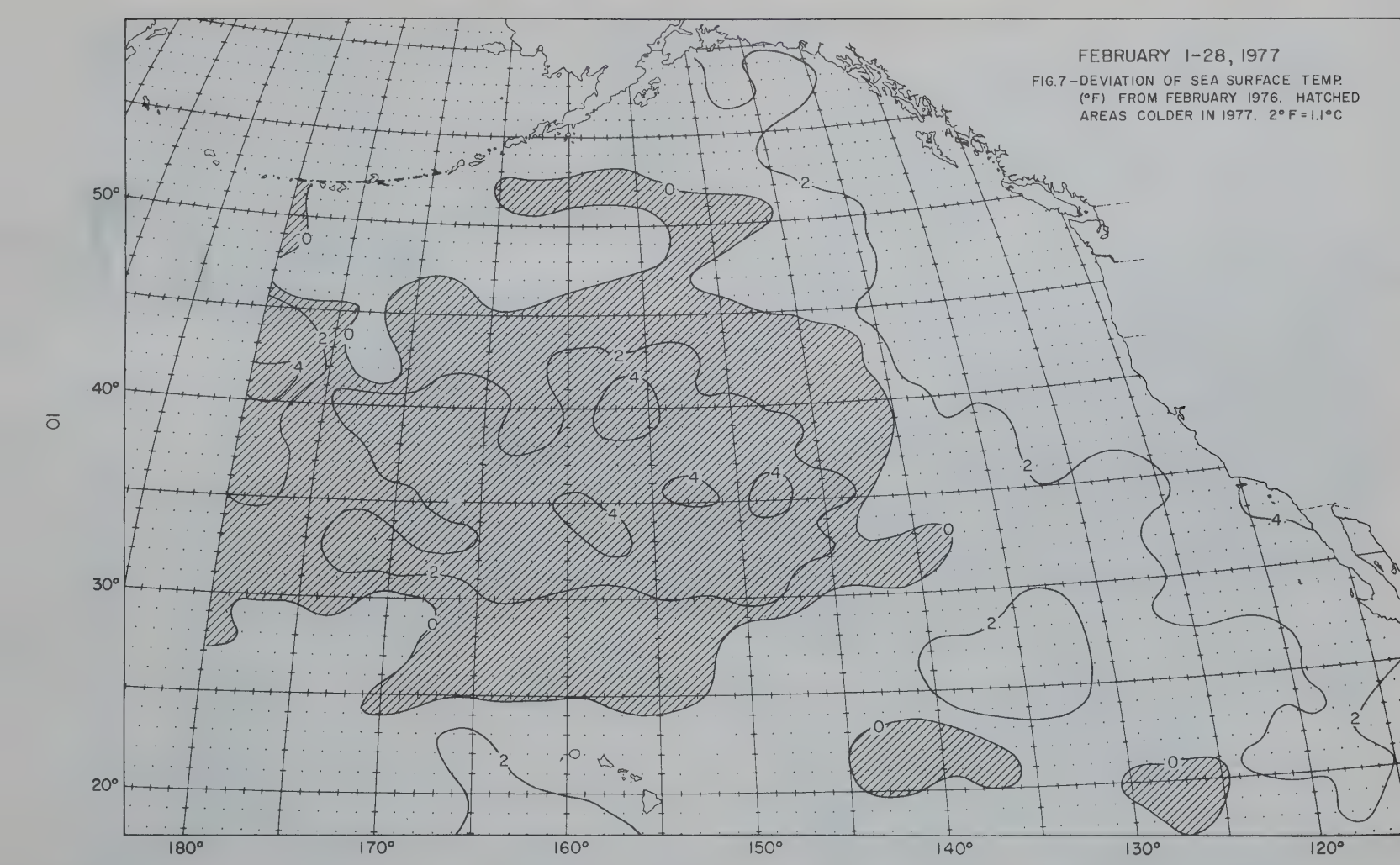

FEBRUARY 1977
FIG. 2 — OBSERVED VALUES
-0000- BAROMETRIC PRESSURE (MILLIBARS).
RESULTANT WIND DIRECTION.
No. / No. RESULTANT WIND SPEED (KTS.) / AVERAGE WIND SPEED (KTS.) REGARDLESS OF DIRECTION.
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
988
992
996
1000
1004
1008
1012
1016
1020
1024
1020

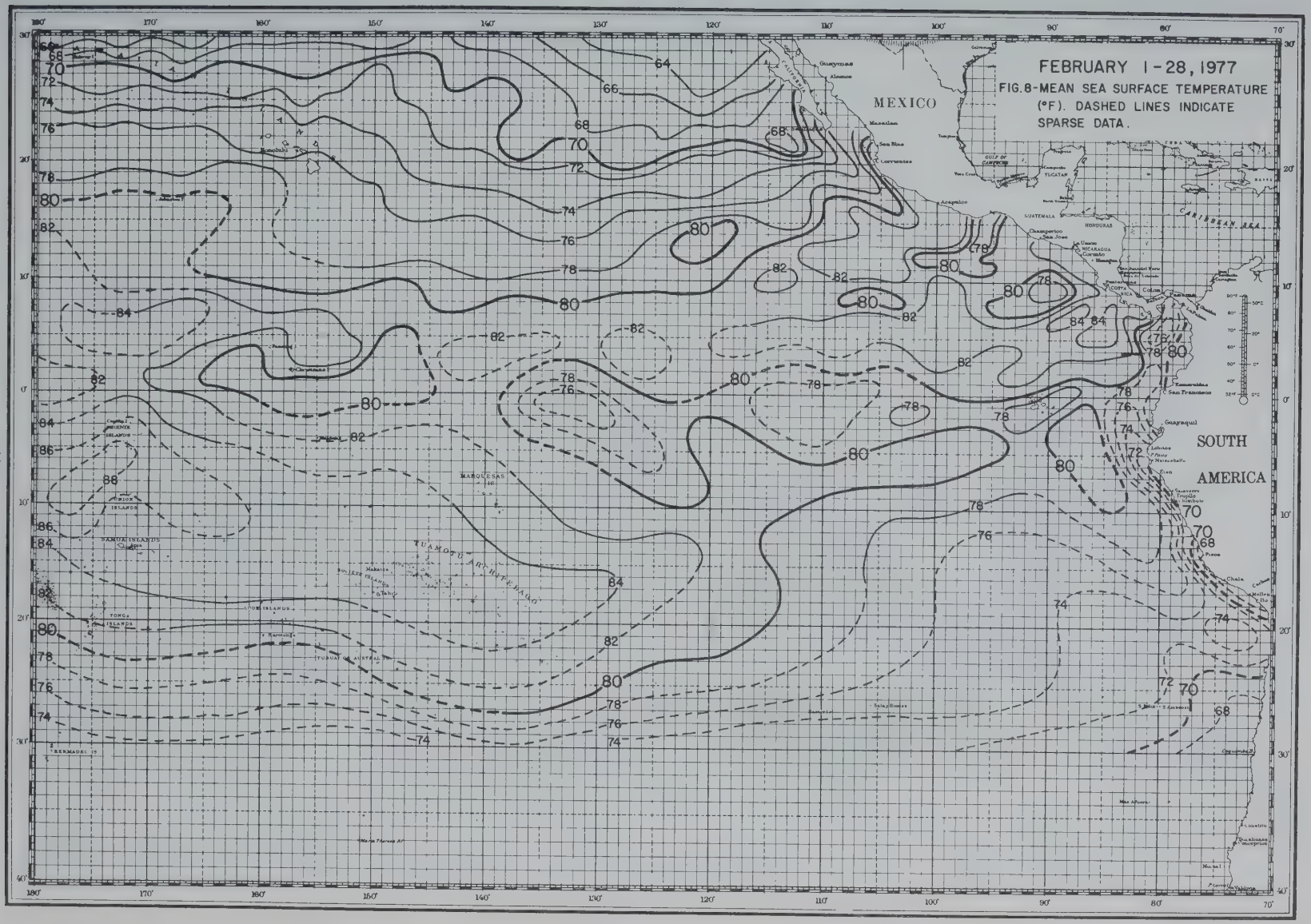

FEBRUARY 1-28, 1977
FIG. 3-MEAN SEA SURFACE TEMPERATURE (°F)
50°
40°
30°
20°
180°
170°
160°
150°
140°
130°
120°


FEBRUARY 1-28, 1977
FIG.4-MEAN SEA SURFACE TEMPERATURE (°F.)
34
36
32
38
40
42
44
46
48
50
52
54
56
58
60
60
62
64
66
68
68
70
72
74
76
78
80
80
82
82
60°
50°
40°
30°
20°
120°
130°
140°
150°
160°
170°
180°


FEBRUARY 1-28, 1977
FIG. 5 - DEVIATION OF SEA SURFACE TEMP. (°F) FROM 20-YEAR MEAN (1948-1967). HATCHED AREAS COLDER IN 1977. 2°F = 1.1°C
50°
40°
30°
20°
180°
170°
160°
150°
140°
130°
120°
2
0
2
4
2
2
0
2
0
2
0
0
2


FEBRUARY 1-28, 1977
FIG. 6-DEVIATION OF SEA SURFACE TEMP. (°F) FROM 20-YEAR MEAN (1948-1967). HATCHED AREAS COLDER IN 1977. 2°F = 1.1°C
60°
50°
40°
30°
20°
120°
130°
140°
150°
160°
170°
180°


FEBRUARY 1-28, 1977
FIG.7-DEVIATION OF SEA SURFACE TEMP. (°F) FROM FEBRUARY 1976. HATCHED AREAS COLDER IN 1977. 2° F = 1.1°C
50°
40°
30°
20°
180°
170°
160°
150°
140°
130°
120°
0
2
4


FEBRUARY 1-28, 1977
FIG. 8-MEAN SEA SURFACE TEMPERATURE (°F). DASHED LINES INDICATE SPARSE DATA.
MEXICO
SOUTH AMERICA
CARIBBEAN SEA
GUATEMALA
HONDURAS
NICARAGUA
COSTA RICA
PANAMA
TUAMOTU ARCHIPELAGO
MARQUESAS
SAMOA ISLANDS
TONGA ISLANDS
BERMUDA

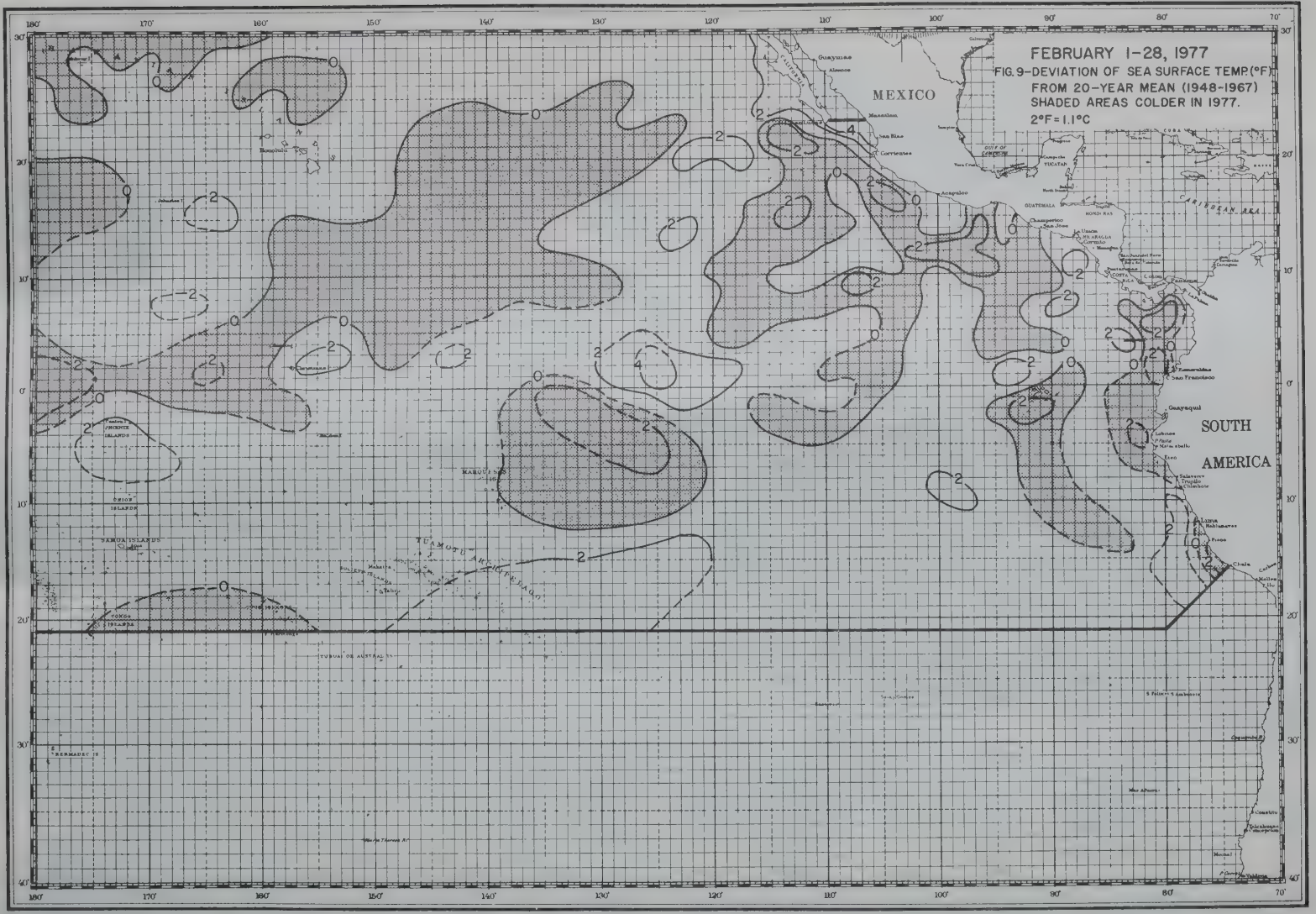

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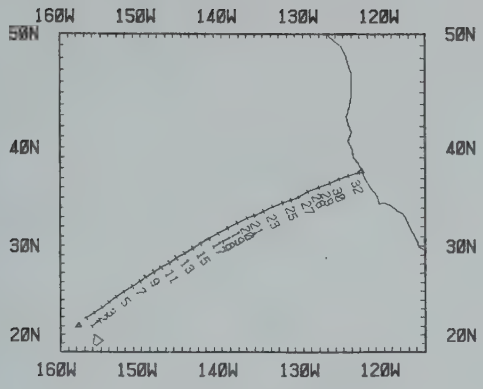
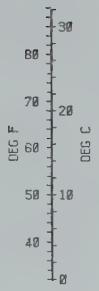
FIG. 9-DEVIATION OF SEA SURFACE TEMP.(°F)
FROM 20-YEAR MEAN (1948-1967)
SHADED AREAS COLDER IN 1977.
2°F = 1.1°C
MEXICO
SOUTH
AMERICA
CARIBBEAN SEA
GUATEMALA
HONDURAS
COSTA RICA
PANAMA
Acapulco
Guayaquil
Lima
Callao
Chala
Honolulu
Johnston I.
Christmas I.
Line Islands
Phoenix Islands
Ocean I.
Gilbert Islands
Samoa Islands
Tokelau Islands
Tuvalu (Ellice Islands)
Tuamotu Archipelago
Tahiti
Pitcairn I.
Easter I.
Juan Fernandez Is.
Galapagos Is.
Bermuda Is.
Mar del Plata
Rio de Janeiro
Valparaiso
Concepcion
Puerto Montt
Chiloe I.
Malpelo I.
Cocos I.
Clipperton I.
180°
170°
160°
150°
140°
130°
120°
110°
100°
90°
80°
70°
30°
20°
10°
0°
40°

FIGURE 10





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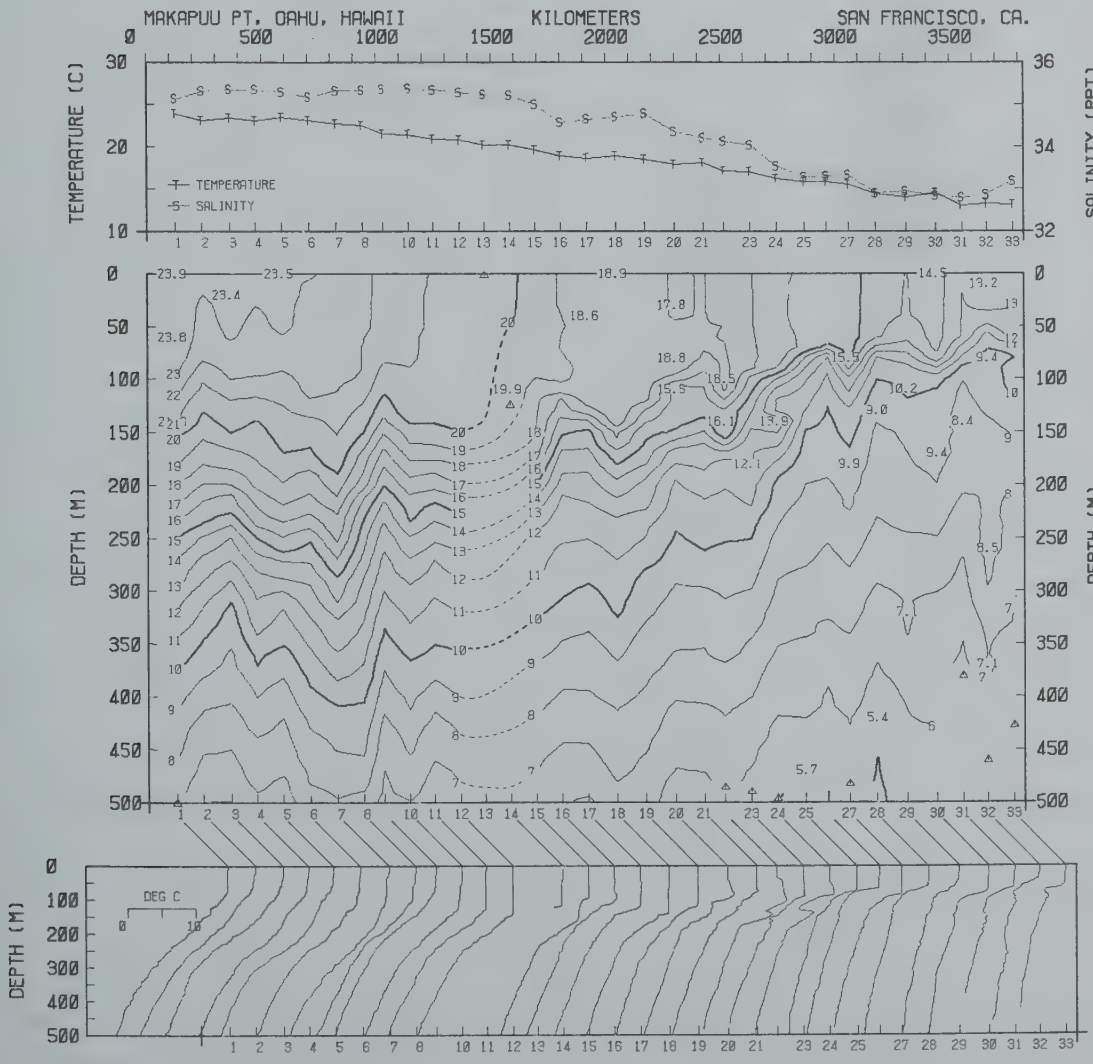

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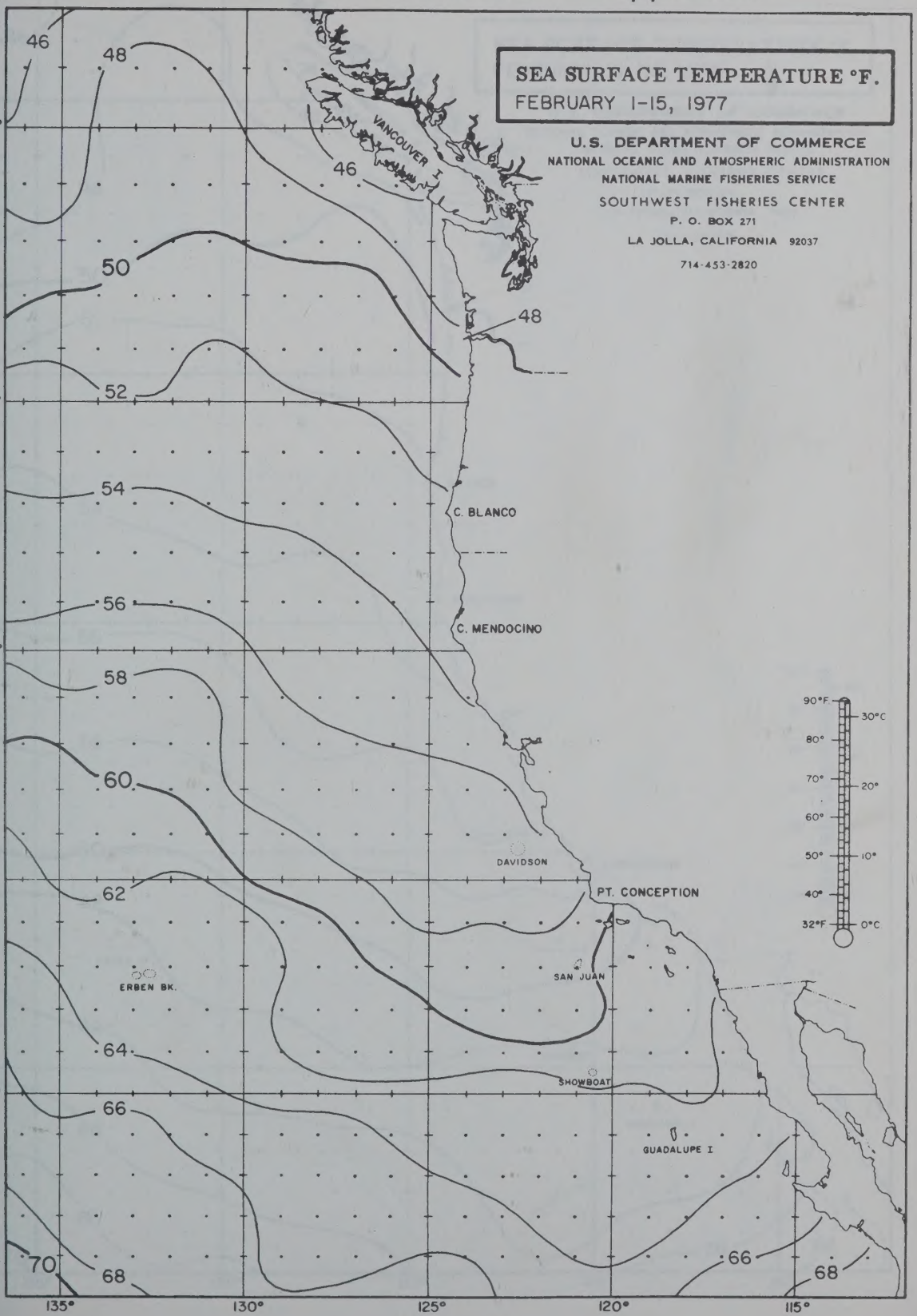

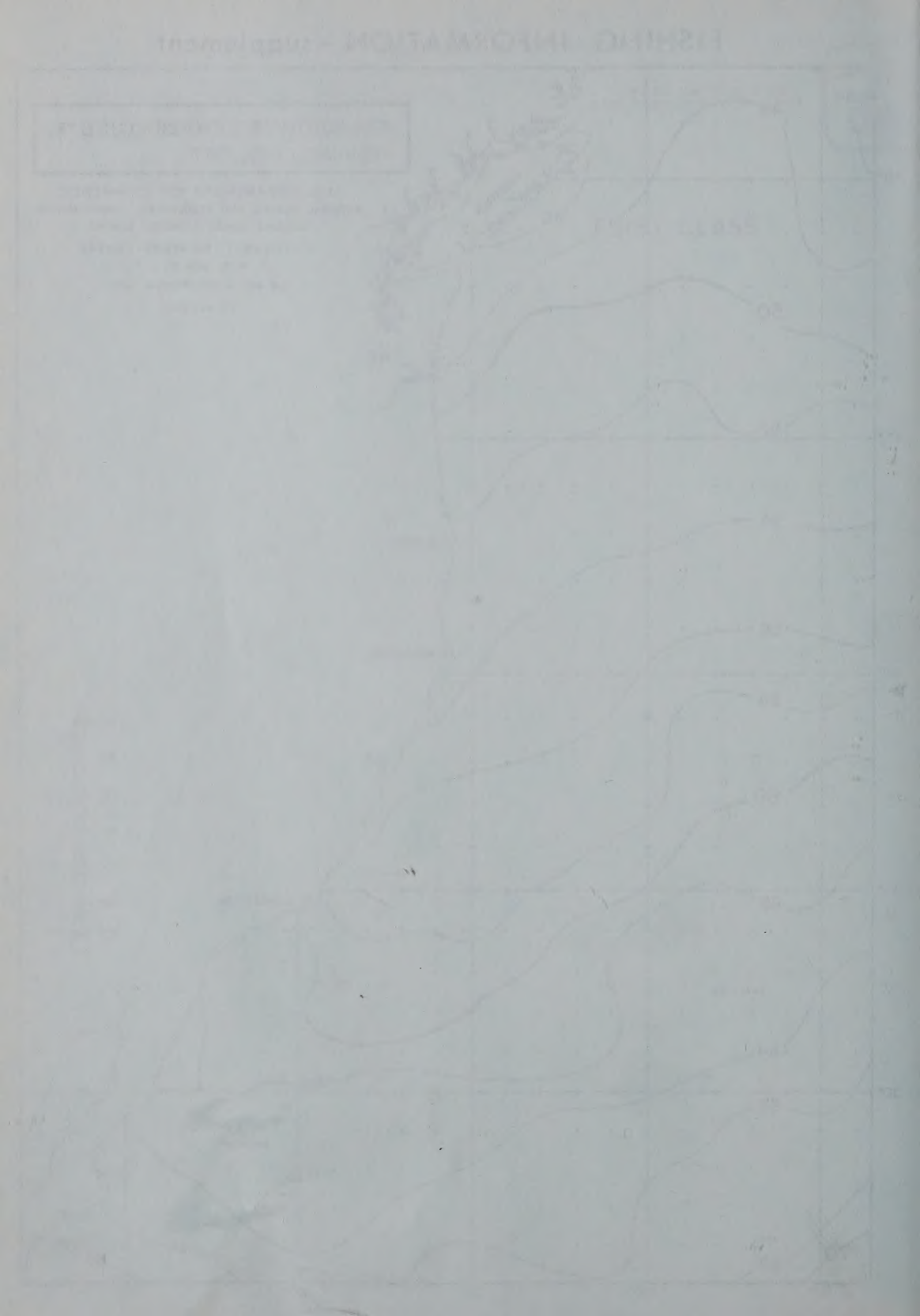

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